# An Innovative Approach to Condition Assessments at the “Big 9”

- Implementation and Lessons Learned

Orlando, Florida

May 4,2004

# NPS assets enable the park experience and thus require diligent stewardship

- Responsible and conscientious asset management is vital to each park's fulfillment of the NPS mission.
  - Park assets are important. They either facilitate the visitor experience, are the visitor experience or protect the resources
  - Assets provide for human interaction with history, allowing safe travel, exploration and learning opportunities for all
- Operating and maintaining the extensive infrastructure in parks across the nation requires substantial resources and over time, the National Park Service inventory has fallen in disrepair
  - Further, adequate tools and effective, standardized business practices have not until now been universally implemented or available
  - Successful stewardship depends on park participation

# NPS operates and maintains a large, diverse asset inventory

| National Park Service Asset Inventory (as of September 30, 2003) | |
|---|---|
| Paved Roads | 5,456 miles |
| Unpaved Roads | 4,758 miles |
| Trails | 16,741 miles |
| Campgrounds | 1,168 |
| Buildings | 17,454 |
| Employee Housing Units | 4,783 |
| Water Treatment Systems | 1,282 |
| Waste Water Treatment Systems | 1,433 |

Figure 1: These eight categories are comparable to the asset portfolios of other institutional and industry facility stewards. The National Park Service manages over thirty categories of assets in total, including maintained landscapes, picnic areas, waterways, monuments and fortifications, ruins, and aviation and railroad systems. Protecting many of these assets into perpetuity is a challenge unique to the National Park Service.

# The condition of assets within the National Parks infrastructure has gradually deteriorated.

In April, 2002, GAO estimated the cost of deferred maintenance projects to exceed $4.9 billion.

United States General Accounting Office

GAO

Report to the Ranking Minority Member, Subcommittee on National Parks and Public Lands, Committee on Resources, House of Representatives

May 1998

## National Park Service

## Efforts to Identify and Manage the Maintenance Backlog

GAO
Accountability • Integrity • Reliability

United States General Accounting Office
Washington, DC 20548

April 12, 2002

The Honorable Joe Skeen
Chairman,
The Honorable Norman D. Dicks
Ranking Minority Member,
Subcommittee on Interior and Related Agencies
Committee on Appropriations
House of Representatives

Subject: National Park Service: Status of Efforts to Develop Better Deferred Maintenance Data

April 24, 2002

The New York Times editorial

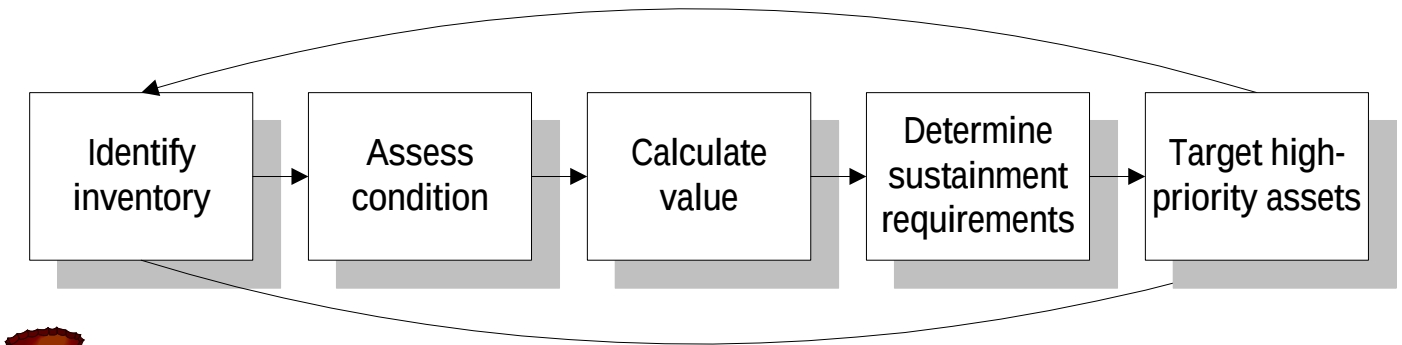
**Parks Under Siege**

Most modern presidents have promised to fix the nation's deteriorating national park system. Nearly all have shortchanged it. Mindful of that record, and sensing an easy political opportunity, President Bush made the parks the centerpiece of his modest environmental agenda in the 2000 campaign. He pledged to provide $1 billion a year to erase a huge $4.9 billion repair backlog, thereby relieving park managers of day-to-day budgetary crises and freeing them to focus on protecting natural resources. But as the busiest season for the parks commences, it is clear that Mr. Bush has made no more headway than his predecessors.

Hardly a single unit in the system's 385 historic sites, monuments and

# To combat this trend, the Park Facility Management Division (PFMD) for NPS is implementing an asset management program to improve the condition of the portfolio

- This program addresses key asset management questions:
  - What assets does the park own?
  - What is the condition of each asset?
  - What is the Current Replacement Value (CRV) of each asset?
  - What is required to properly sustain the portfolio over time?
  - Which assets are the highest priority (using the Asset Priority Index* (API)) and where should a park focus resources?
- Specifically, asset management is an ongoing process consisting of five basic steps




***Asset Priority Index (API)**

Park management assigns a priority score to each asset using the NPS-developed API. The API reflects the asset's relative importance to the park mission. Prioritizing assets is an important element of the asset management process because it helps managers target specific maintenance needs, maximizing available project funding.

# The assessment management program is supported by a number if tools and systems

- Implementing a modified COTS system (MAXIMO) to…
  - Define and collect information about the NPS asset inventory
  - Valuate the inventory
  - Assess the inventory and document deficiencies through comprehensive condition assessments
  - Develop cost estimates to correct the deficiencies
  - Schedule work to begin addressing the deficiencies to spend down the backlog
- The system incorporates cost estimating tools (RS Means based Timberline) called the Cost Estimating Software System (CESS)
- The system incorporates project planning information from the Project Management Information System (PMIS)
- The integration of MAXIMO, CESS, and PMIS, is all collectively referred to as the Facility Management Software System (FMSS)

# With the process and tools in place, PFMD developed a strategy and timeline for implementing the asset management program

- Parks were tasked with...

1. Capturing the park inventory:  count, size, Current Replacement Value (CRV) and Asset Priority Index (API) score
2. Conducting condition assessments:

– Annual condition assessments: scheduled each year to capture obvious and apparent deficiencies

– Comprehensive assessments:  a detailed examination of current deficiencies and out-year component renewal requirements

3. Begin using inventory, value, priority, deficiency, and out year requirement information to make strategic management decisions

# Parks with the largest inventory struggled to meet the goal with scarce resources within the time frame

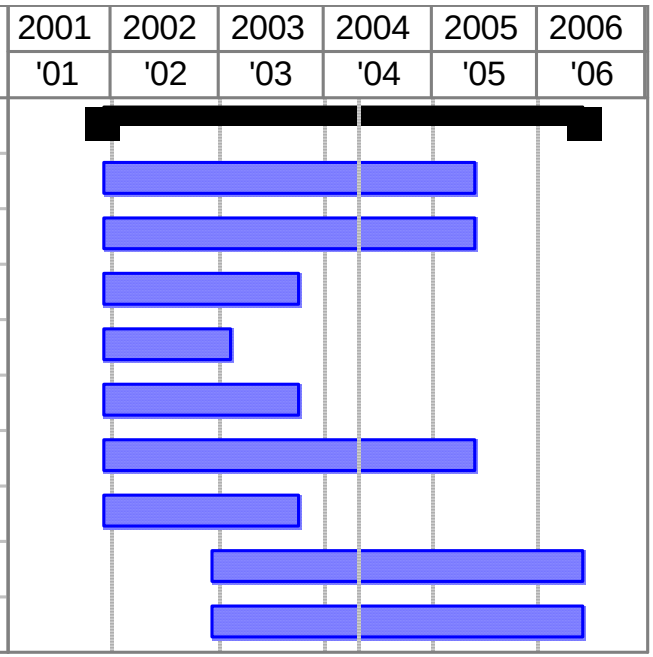
- The inventory at the nine most asset-intensive parks is substantial. When looking at just administrative/public use buildings, historic structures, houses, and outbuildings the Big 9 include 7.6 million square feet and more than 4,000 structures*
- Big 9 contain approximately 20% of all NPS assets

| Park | Buildings, Housing & Outbulidings | Square Feet |
|---|---|---|
| Yellowstone | 469 | 993,164 |
| Yosemite | 657 | 743,489 |
| Grand Canyon | 794 | 821,755 |
| Rocky Mountain | 490 | 517,282 |
| Delaware Water Gap | 504 | 763,586 |
| Gateway | 203 | 1,643,784 |
| Great Smoky Mountains | 453 | 461,311 |
| Golden Gate | 505 | 1,606,261 |
| Appalachian Trail (mostly trails assets) | n/a | 83,544 |
| | | |
| Total | 4075 | 7,634,176 |

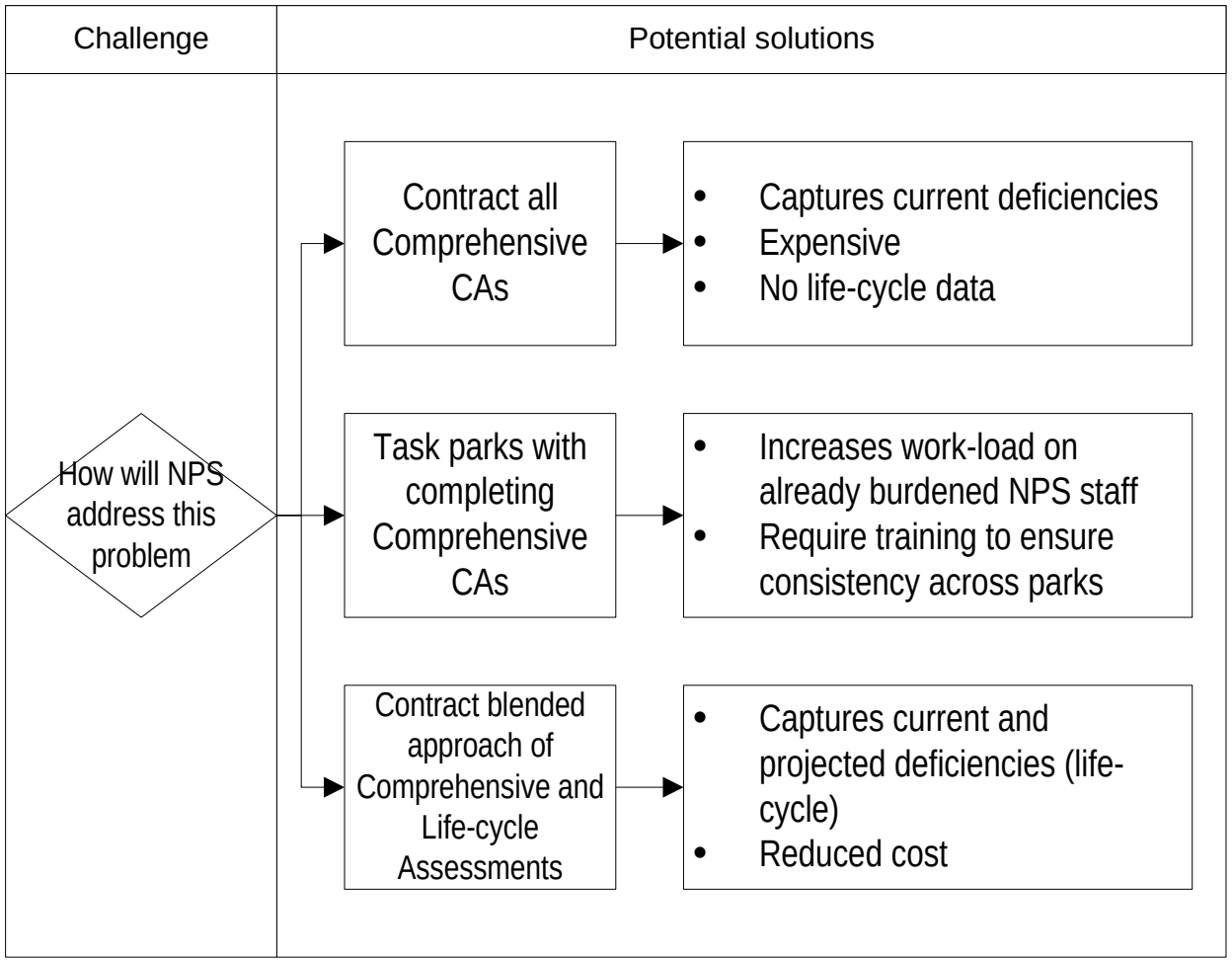
*Does not include concession or partner owned/maintained assets.

# Original schedule to complete Big 9 condition assessments extended through 2006

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | **Park** | **1175 days** | **12/3/01** | **6/2/06** |
| 2 | Yellowstone | 915 days | 12/3/01 | 6/3/05 |
| 3 | Yosemite | 915 days | 12/3/01 | 6/3/05 |
| 4 | Grand Canyon | 485 days | 12/3/01 | 10/10/03 |
| 5 | Rocky Mountain | 315 days | 12/3/01 | 2/14/03 |
| 6 | Delaware Water Gap | 485 days | 12/3/01 | 10/10/03 |
| 7 | Gateway | 915 days | 12/3/01 | 6/3/05 |
| 8 | Great Smoky Mountains | 485 days | 12/3/01 | 10/10/03 |
| 9 | Golden Gate | 915 days | 12/2/02 | 6/2/06 |
| 10 | Appalachian Trail | 915 days | 12/2/02 | 6/2/06 |



# PFMD considered different options to complete the condition assessments at the Big 9

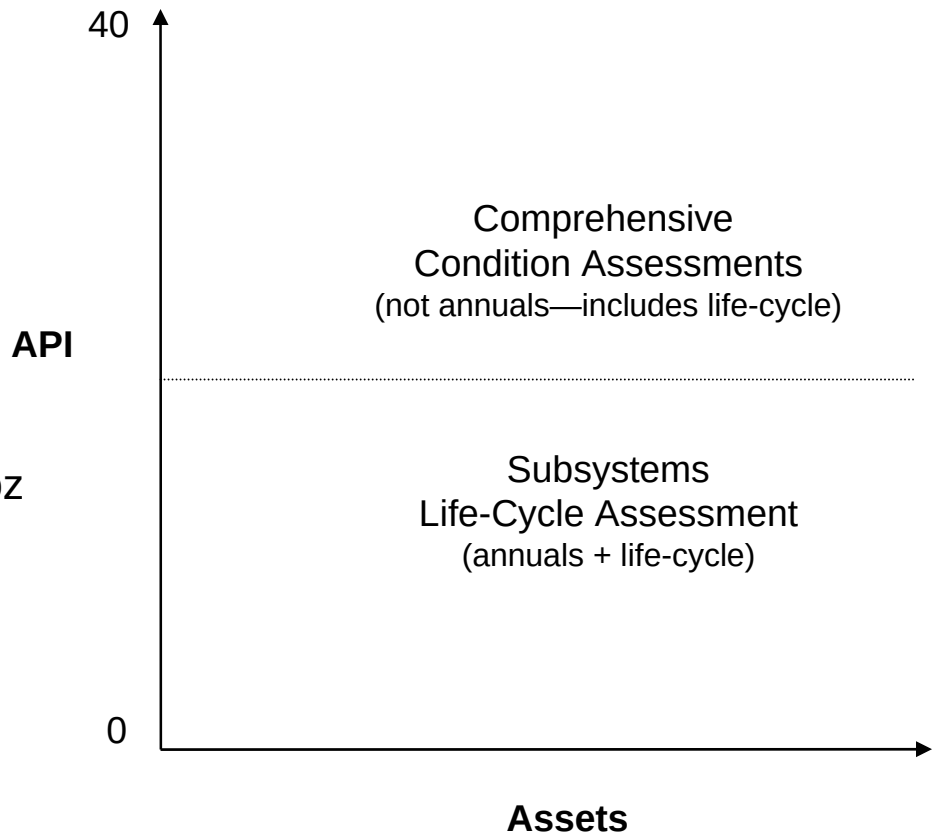



1. Contract all comprehensive assessments to an outside firm
2. Train and task parks with completing the comprehensive assessments with existing staff
3. Consider an alternative approach…

# An alternative approach was proposed by Booz Allen to complete the Big 9 ahead of schedule and with fewer resources

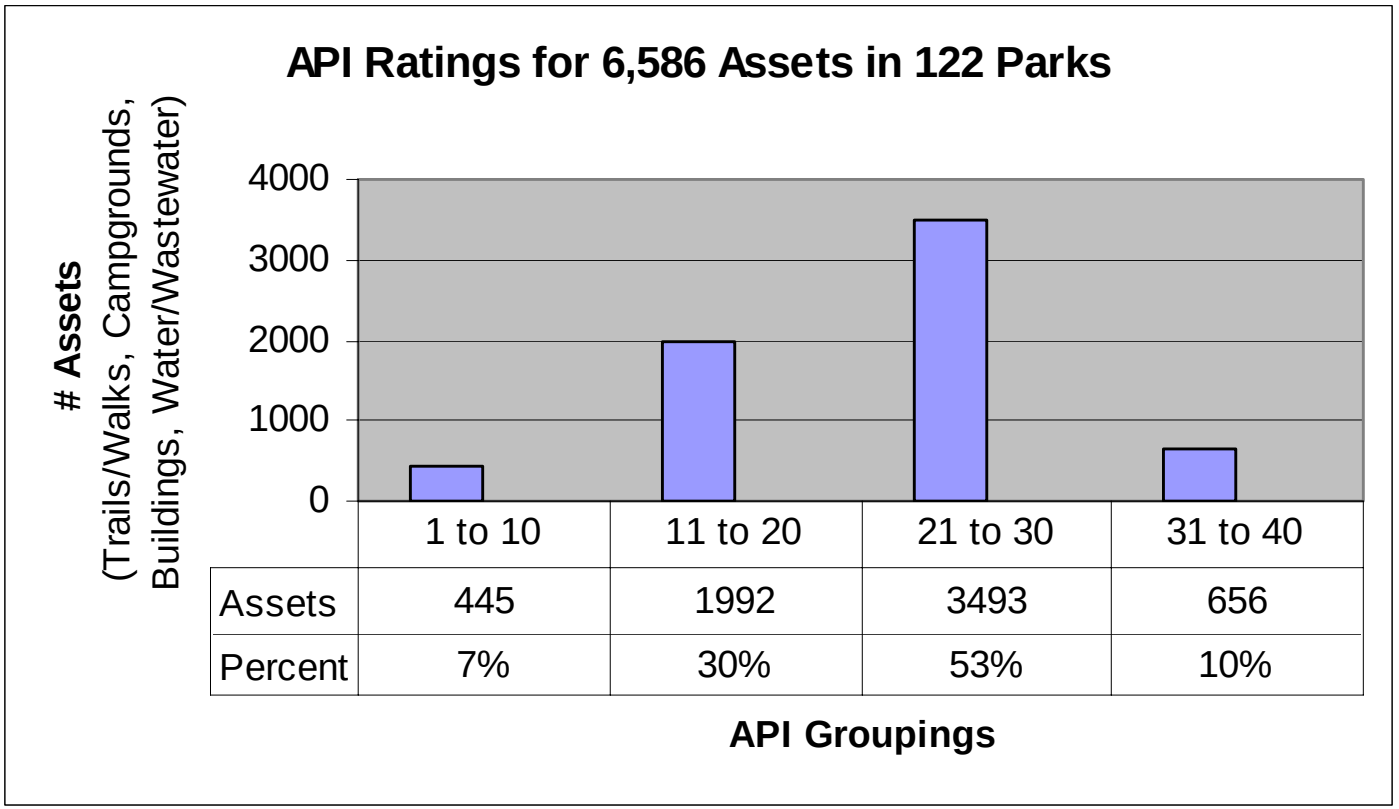
- The strategy would use a graded approach employing industry accepted condition assessment and life-cycle assessment strategies
- Strategy would rely on the NPS asset priority index (API) to assist in determining which assets would receive a comprehensive CA and which ones would receive a life-cycle assessment
- All comprehensives would be conducted by an A&E firm while LCAs would be completed by Booz Allen staff
- All data would be entered into FMSS upon completion

Note: Does not include paved roads (FHWA) and unique assets on extended schedules (e.g., sculptures, monuments, ruins)



# Overall, approximately 60 percent of the assets had an API score over 20.

- Using the general rule an API score of 20 as the cut point, NPS anticipated a 60/40 split between comprehensive and life-cycle assessments



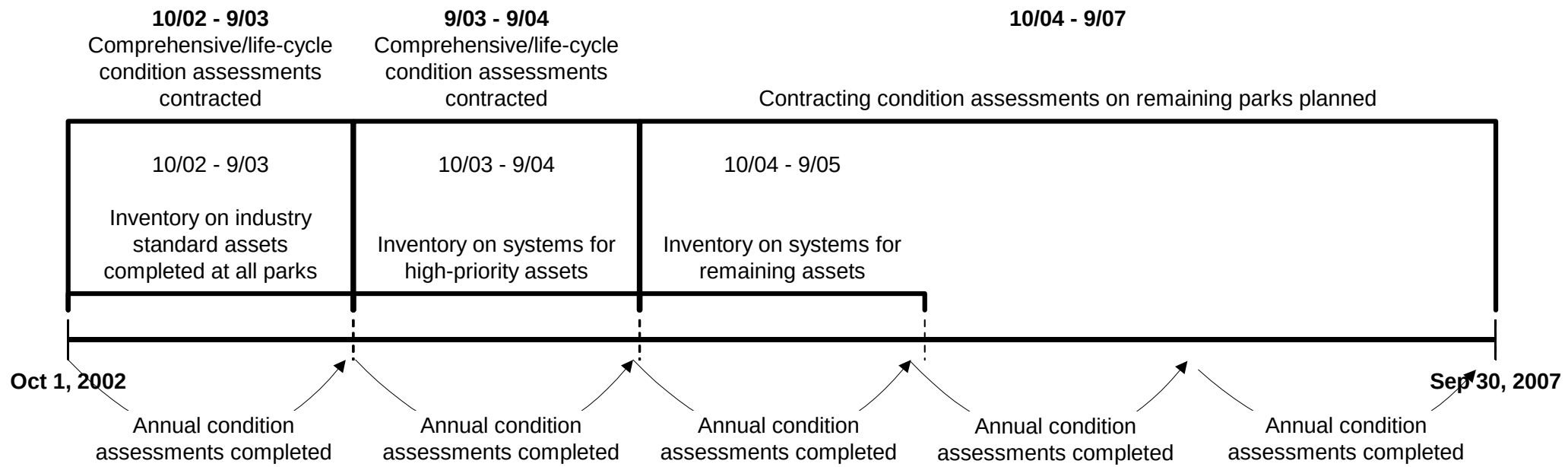
# Life-cycle condition assessments (LCAs) are a highly reliable and industry accepted method for conducting assessments

- LCA defined: an analytical process for determining asset subsystem replacement needs based on expected design life and expert judgment
- Supported by knowledgeable staff at the park level LCAs represent the best opportunity to streamline NPS's assessment schedule while still gathering high-quality data
- LCAs add a vital dimension to the assessment process: the ability to forecast and estimate predicted projects, thus establishing a recapitalization program (a PFMD goal)

| Park | FMSS Numbe | Asset Description | Yr Built | API | Units (Size) | Unit of M | CRV | Deficiencies | FCI |
|---|---|---|---|---|---|---|---|---|---|
| GRSM | 62865 | SD OC 128 C. JENKINS PIG PEN | 1900 | 30 | 48 | SF | $ 8,800 | $ 1,027 | 0.12 |
| GRSM | 62866 | SD OC 230 JOE QUEEN HOUSE | 1900 | 30 | 1451 | SF | $ 265,000 | $ 860 | 0 |
| GRSM | 63417 | CC 472 CAMPGROUND STORE BUILDING AND | 1958 | 24 | 1540 | SF | $ 187,600 | $ 1,923 | 0.01 |
| GRSM | 63418 | CC 690 CAMPGROUND BICYCLE SHOP & VEN | 1958 | 24 | 1071 | SF | $ 130,500 | $ 8,931 | 0.07 |
| GRSM | 63454 | SD PG 159 NEWFOUND GAP COMFORT STATION | 1940 | 30 | 829 | SF | $ 334,400 | $ 17,859 | 0.05 |
| GRSM | 63455 | SD PG 160 FORMEY RIDGE COMFORT STATION | 1942 | 18 | 826 | SF | $ 334,400 | $ 131,083 | 0.39 |
| GRSM | 63618 | SD HB 306 LCS BALSAM MT. CAMPGROUND COM | 1953 | 30 | 403 | SF | $ 162,600 | $ 949 | 0.01 |
| GRSM | 63621 | SD HB 332 LCS BALSAM MT. CAMPGROUND COM | 1955 | 30 | 403 | SF | $ 162,600 | $ 1,550 | 0.01 |
| GRSM | 63622 | SD HB 333 LCS HEINTOOGA PICNIC AREA COM | 1955 | 30 | 403 | SF | $ 162,600 | $ 5,300 | 0.03 |
| GRSM | 63660 | SD SM 85 SMOKEMONT CG COMFORT STATION- | 1940 | 30 | 522 | SF | $ 210,600 | $ 6,515 | 0.03 |
| GRSM | 63663 | SD SM 86 SMOKEMONT CG COMFORT STATION- | 1940 | 30 | 522 | SF | $ 210,600 | $ 3,975 | 0.02 |
| GRSM | 63665 | SD SM 87 SMOKEMONT CG COMFORT STATION- | 1940 | 30 | 522 | SF | $ 210,600 | $ 11,721 | 0.06 |
| GRSM | 63668 | SD SM 385 SMOKEMONT COMFORT STATION @ R | 1983 | 24 | 468 | SF | $ 94,400 | $ 7,002 | 0.07 |
| GRSM | 63704 | SD OC 162 OCONALUFTEE VISITOR CENTER | 1941 | 33 | 7160 | SF | $ 3,209,100 | $ 14,234 | 0 |
| GRSM | 63705 | SD OC 364 & OC 689 OCONALUFTEE SAR CACH | 1973 | 33 | 1525 | SF | $ 307,600 | $ 8,305 | 0.03 |

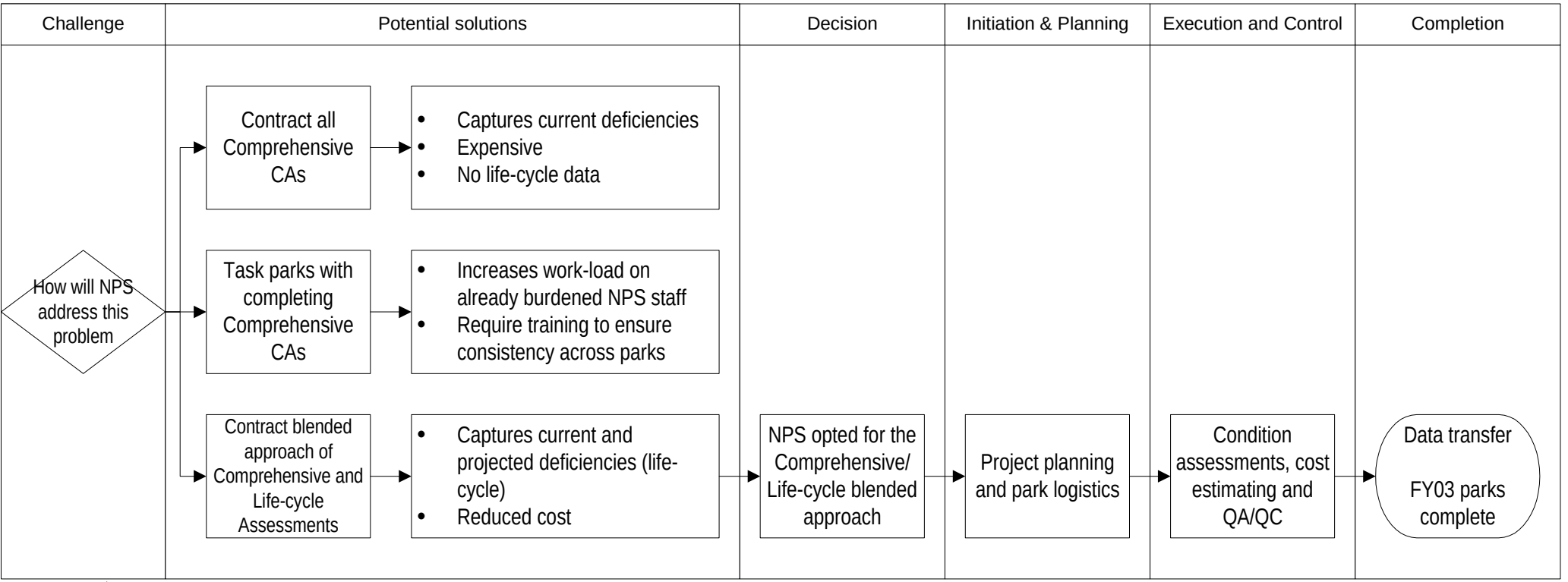
# There were clear benefits to adopting the alternative approach

- PFMD divided the 9 parks into two sets by fiscal year (FY03 and FY04).
- The alternative approach allowed park to reach their goals ahead of schedule and with fewer resources. PFMD refined the timeline, expediting program implementation



# PFMD proceeded with executing the Booz Allen's alternative approach to condition assessments at the Big 9.

- Once under contract, Booz Allen worked with PFMD and the parks to begin planning to complete condition assessments according to the revised schedule

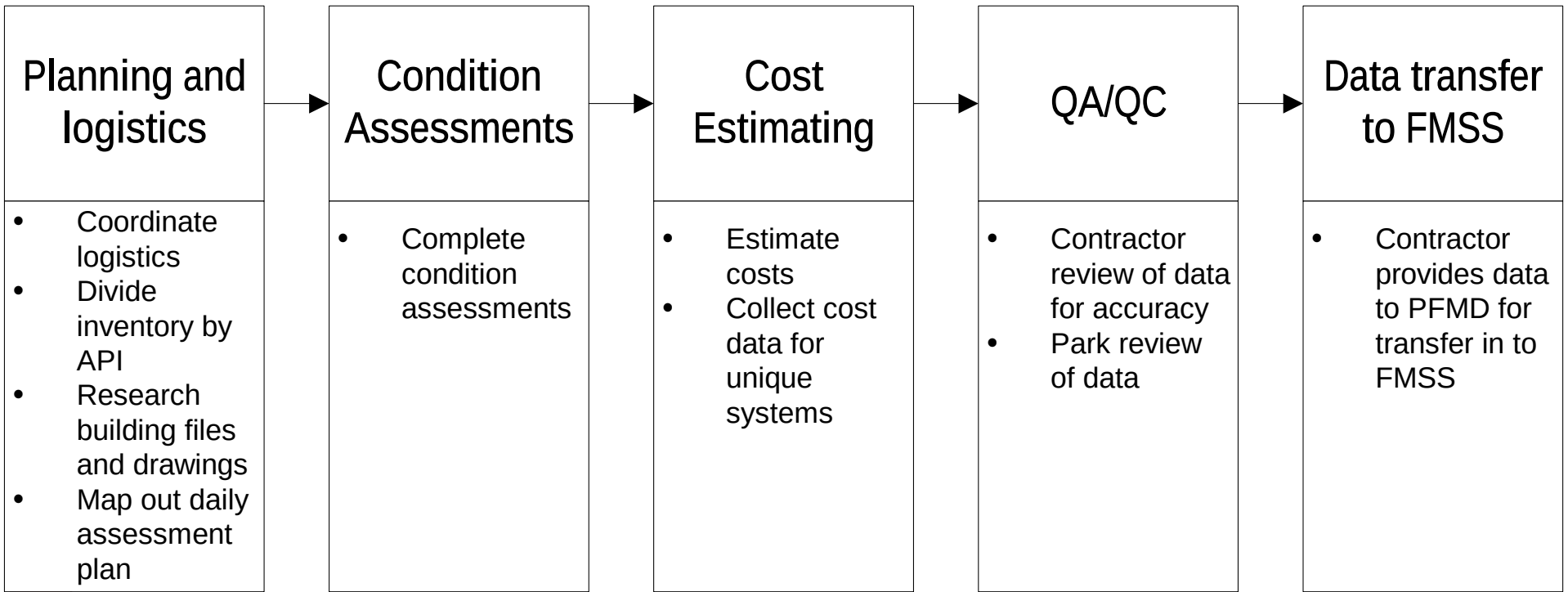


# Booz Allen, PFMD and park staff shared responsibilities for completing the condition assessments

- Contractors were responsible for…
  - Conducting all training
  - Coordinating all planning activities at parks
  - Conducting all comprehensives and life-cycle assessments (building structures)
  - Performing all cost estimating tasks
  - Populating FMSS
- PFMD and park staff were responsible for…
  - Coordinating logistics
  - Participating as active members of contractor teams
  - Conducting assessments on all linear assets (e.g., trails, pipe, electric distribution line)

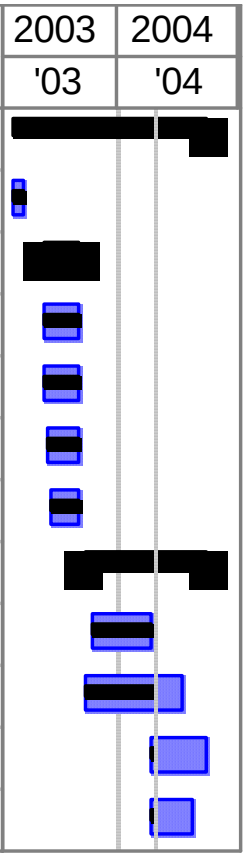
# The condition assessment process consisted of five basic steps

- Each step was critical to ensuring an accurate data set at the end of the project
- PFMD and park staff was involved at each step to facilitate and provide background information and guidance on park assets



# Adopting the alternative approach allowed NPS to significantly reduce the project duration

| ID | Task Name | % Complete | Duration | Start | Finish |
|---|---|---|---|---|---|
| 12 | **Big 9** | **73%** | **426 days** | **2/10/03** | **9/27/04** |
| 13 | ROMO pilot | 100% | 30 days | 2/10/03 | 3/21/03 |
| 14 | **2003 Parks** | **100%** | **82 days** | **5/16/03** | **9/8/03** |
| 15 | YOSE | 100% | 80 days | 5/16/03 | 9/4/03 |
| 16 | GRCA | 100% | 80 days | 5/16/03 | 9/4/03 |
| 17 | DEWA | 100% | 75 days | 5/27/03 | 9/8/03 |
| 18 | GRSM | 100% | 70 days | 6/2/03 | 9/5/03 |
| 19 | **2004 Parks** | **58%** | **271 days** | **9/15/03** | **9/27/04** |
| 20 | GOGA | 100% | 140 days | 10/6/03 | 4/16/04 |
| 21 | YELL | 75% | 220 days | 9/15/03 | 7/16/04 |
| 22 | APPA | 14% | 125 days | 4/6/04 | 9/27/04 |
| 23 | GATE | 19% | 100 days | 4/5/04 | 8/20/04 |




- Comprehensive and life-cycle assessments are nearly 75% complete

# Lessons Learned

# As condition assessments began, “lessons learned” were communicated by field teams to the Booz Allen project manager

- Both NPS and BAH staff are essential for reliable and efficient data collection
  - BAH provides a new methodology for conducting the assessments (maintenance staff on any organization want to pursue the traditional means of figuring out what it will take to repair a system)
  - NPS maintenance staff provide both a “reality check” for the data on the nameplate, as well as the park-specific conditions (adjustments to estimated design lives, union wages for costing issues, historic renovation vs. replacement costs)
- Assets to be assessed are spread out geographically…structuring routes efficiently saves time
  - Importance of working with NPS staff prior to arrival to establish a schedule that works both geographically and practically (e.g., access to residences)
- Communicating the process and assessment schedule to the park upfront helped ensure a coordinated effort at the height of the busy summer season

# Some additional program management efforts proved beneficial

- Integrated relevant project management “best practices” into a cohesive, structured and predictive process (captured in the Project Management Plan (PMP)) and shared the plan with PFMD and parks
- Emphasized project communications both within the contractor teams as well as with PFMD and park staff. Booz Allen…
  - hosted regular status meetings and calls
  - provided bi-weekly status reports and
  - maintained a central project website to store and share project information
- Defined roles and responsibilities at the outset
- Created incentives and rewards for a job especially well done. During FY03, NPS and Booz Allen each recognized four outstanding staff members for their contribution to the project
- Identified risks upfront and created a central repository for collecting risks and issues throughout the project’s duration. Reviewed these during regular status meetings

# We believe that the condition assessment process is a critical element within the asset management program

- Asset data better prepares park managers with the knowledge of what is wrong today as well as an annual projection of costs for years in to the future
- Understanding these deficiencies and costs extends the park manager's influence over the long-term focus of park spending and…
- Increases the ability to articulate consequences of not funding necessary life-cycle maintenance